

8 TROUBLESHOOTING

A troubleshooting guide is given in Table 8-1. Possible causes are given and fault isolation techniques or solutions are provided for a variety of potential symptoms.

TABLE 8-1. TROUBLESHOOTING GUIDE		
SYMPTOM	POSSIBLE CAUSE	FAULT ISOLATION/SOLUTION
Both PC and SRP dead	AC power	<ol style="list-style-type: none"> 1. House AC supply source off (check fuse or breaker). 2. AC lines not connected to power source.
PC OK but SRP dead	AC power	<ol style="list-style-type: none"> 1. AC line not connected to power source. 2. Switch on back of electronics module not on. 3. Check main fuse on back of Electronics Module.
PC display dead	AC power	<ol style="list-style-type: none"> 1. AC power switch on display in off position; check switch. 2. AC line not connected to power source.
No output from O ₃ generator	UV lamp not on	<ol style="list-style-type: none"> 1. Disconnect O₃ line from front of pneumatic module look in fitting to confirm that lamp is off. 2. If off, open top of pneumatic module. Confirm if red or green LED illuminated on PCI 2400 power supply card. 3. If illuminated, replace generator lamp. 4. If not illuminated, check pins 10 and J on input connector to power supply for 24 VDC. 5. Check J1 connector on both ends. 6. Check 24 volt power supply in Electronics Module. 7. If all above OK, replace PCI 2400 power supply.
Output from O ₃ generator not steady	<ol style="list-style-type: none"> 1. Temperature controller 2. Bad UV lamp 3. Bad PCI 2400 power supply 4. 24 volt DC power supply 	<ol style="list-style-type: none"> 1. This temperature controller is same as source block controller. See procedure in Section 7.4, Source Block Temperature Check and Adjustment Procedure. 2. Try new lamp. 3. If still bad, check pins 10 and J on input connector to power supply for steady 24 VDC. If not steady replace 24 volt power supply.
SRP pump dead	24 volt DC to pump	<ol style="list-style-type: none"> 1. Check orange and yellow leads on terminal strip in Pneumatic Module for 24 VDC. 2. If 24 VDC present, check switch. 3. If OK, replace pump. 4. If 24 VDC not present in 1 above, check J1 connector on both ends. 5. Check 24 volt power supply in Electronics Module.

During verification, indicated O ₃ drops when second system starts sampling	Insufficient flow in O ₃ manifold	Increase flow with control pot on front of Pneumatic Module.
Dark counts to low (less than 5) or to high (greater than 20)	Normal drift in electronics	Adjust - See Section 7.7, SRP Dark Count Check and Adjustment Procedure.
Dark counts shift by large amount	Contact resistance change	Turn Off Power: <ol style="list-style-type: none"> 1. Disconnect detector line from both ends (detector block and back of Electronics Module). Check that connector is screwed together tightly. Connect and disconnect both ends of line from connectors several times. Make sure connector seats fully (makes clicking

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SYMPTOM	POSSIBLE CAUSE	FAULT ISOLATION/SOLUTION
		sound). 2. Open end of detector block (4 small screws), unplug detector voltage-to-frequency card and clean card contacts with CLEAN pencil eraser. 3. Check ± 15 volt outputs on front power supply for steady output. 4. Room temperature fluctuations more than $\pm 3^{\circ}\text{F}$.
Full (total) counts to low (less than 70,000)	1. UV lamp out of alignment 2. UV lamp power supply adjustment to low 3. UV lamp bad 4. UV source block temperature controller 5. UV lamp power supply bad	1. Realign UV lamp. 2. Adjust UV power supply output. 3. Replace UV lamp. For 1-3, see Section 7.3, UV Lamp Check, Adjustments, and Replacement Procedures. 4. Source block temperature controller malfunction (not heating). See Section 7.4, UV Source Block Temperature Check and Adjustment Procedure. 5. Replace UV lamp power supply. DO NOT ATTEMPT TO CHECK VOLTAGE THIS IS A HIGH VOLTAGE POWER SUPPLY.
Full (total) counts to high (greater than 100,000)	1. UV lamp power supply adjustment to high 2. UV source block temperature controller	1. Adjust UV power supply output. See Section 7.3, UV Lamp Check, Adjustments, and Replacement Procedures. 2. Source block temperature controller malfunction (continuous heating). See Section 7.4, UV Source Block Temperature Check and Adjustment Procedure.

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SYMPTOM	POSSIBLE CAUSE	FAULT ISOLATION/SOLUTION
Full (total) counts suddenly drop	<ol style="list-style-type: none"> 1. UV source block temperature controller 2. UV lamp power supply bad 	<ol style="list-style-type: none"> 1. Verify that controller is heating source block. 2. Verify temperature of source block (42 - 50°C). 3. Verify that controller is cycling (on/off). See Section 7.4, UV Source Block Temperature Check and Adjustment Procedure. 4. Replace UV lamp power supply. DO NOT ATTEMPT TO CHECK VOLTAGE. THIS IS A HIGH VOLTAGE POWER SUPPLY.
Stability check (See Section 7.6, SRP Stability Check Procedure) Indicates standard deviation values for both cells are high (greater than 5)	<ol style="list-style-type: none"> 1. UV source block temperature controller 2. UV lamp bad 3. UV lamp power supply bad 	<ol style="list-style-type: none"> 1. Verify that controller is heating source block. 2. Verify temperature of source block (42 - 50°C). 3. Verify that controller is cycling (on/off). See Section 7.4, UV Source Block Temperature Check and Adjustment Procedure. 4. Replace UV lamp. 5. Replace UV lamp power supply. See Section 7.5. DO NOT ATTEMPT TO CHECK VOLTAGE. THIS IS A HIGH VOLTAGE POWER SUPPLY.
Stability check (See Section 7.6, SRP Stability Check Procedure) Indicates standard deviation values for only one cell is high (greater than 5)	Detector is noisy	Replace detector.
High standard deviations (greater than 1 ppb) when assaying O₃.	<ol style="list-style-type: none"> 1. O₃ generator output not stable 2. UV source block temperature controller 3. UV lamp power supply output not stable 4. Pump diaphragm has cracked 5. Rotometer has leak in it. 	<ol style="list-style-type: none"> 1. Try other source of O₃. 2. Verify that controller is heating source block. 2. Verify temperature of source block (42 - 50°C). 3.1. Verify that controller is cycling (on/off). See Section 7.4, UV Source Block Temperature Check and Adjustment Procedure. 3.2. Replace UV lamp power supply. See Section 7.5. DO NOT ATTEMPT TO CHECK VOLTAGE. THIS IS A HIGH VOLTAGE POWER SUPPLY. 4. Replace diaphragm 5. Replace rotometer or replace O-rings

9 MALFUNCTIONS

Anytime the SRP malfunctions or there are indications that the SRP's performance is unsatisfactory, contact the OAQPS SRP coordinator at the following address:

Scott Moore
Office of Research and Development (ORD)
National Risk Management Research Laboratory *NRMRL)
Air Pollution Prevention and Control Division (APPCD)
U.S. Environmental Protection Agency
109 TW Alexander Drive
Durham, North Carolina 27711
(919) 541-5104 Office
(919) 601-9163 Mobile
Moore.scott@epa.gov

Note that any repairs should only be performed by a qualified person(s) having knowledge of electrical and mechanical systems (done by NIST preferred). Prior consultation with the OAQPS SRP contact is recommended before performing any repairs.

10 SRP CONTROL SOFTWARE/ UPDATES

A fourth-generation control program for the SRP has been developed by NIST and is now available for purchase. New software was required due to the unavailability of new computers with the ISA bus. New computers are now available with the PCI bus only, which means that the SRPs must now use new PCI control cards. SRP owners who now have the older software operating on older computers do not have to upgrade, however NIST will no longer support the old software. Features of the new software include:

- Operates under Windows XP and Vista Uses Excel™ for report output Reports are customizable
- Calibration is done using scripts, which are customizable
- Up to three instruments can be compared to the SRP, including multiple SRPs
- Guest instruments may be an SRP, Analog input, or Serial input
- Guest O₃ generator may be used in calibration (RS232 only)
- Calibration methods can be saved
- Methods can be linked for totally automated runs

The requirements for this new control program are:

- 1 Ghz or better processor (2.5 Ghz dual core recommended)
- 2 GB or more memory (4 GB recommended)
- Microsoft Excel™ (2003 or 2007)
- Windows Vista or 7.0
- 100 GB Hard Drive recommended
- 20" flat screen monitor
- Two free PCI slots
- CDRom drive

New Version Download (4.41)

The latest version of the control software is here: [SRPControl.msi](#)

Please save the SRPControl.msi file in the temporary directory. If you have a version prior to 4.4, please first uninstall the software by going to the Control Panel, clicking on Add/Remove Programs, and selecting SRP2002 to remove.

You may want to backup the SRP Directory first to save any custom instrument drivers, templates, or guest files you may have.

After uninstalling the older version, double click the SRPControl.msi program you downloaded to start the installation and follow the direction to install the new SRP version.

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<http://www.nist.gov/mml/analytical/gas/SRPpage.cfm>

11 REFERENCES

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2. International Standards Organization (ISO) – International Vocabulary of Basic Terms in Metrology, JCGM_200_2008.pdf, October 08, 2008
3. U.S. Environmental Protection Agency, [*Transfer Standards For Calibration of Air Monitoring Analyzers for Ozone*](#), Technical Assistance Document, November 2010
4. National Ambient Air Quality Standards (73 FR 16436: March 27, 2008 implement its new primary ozone standard)
5. Air Quality Index (AQI), EPA-456/F-09-001, EPA airnow.gov, February 02, 2009
6. "Upgrade and Inter-comparison of the U.S. Environmental Protection Agencies Ozone Reference Standards", Paper # 04-A-530-AWMA, June 22, 2004, James E. Norris, Alan H. Band, Robert J. Bass, and Franklin R. Guenther
7. Standard Operating Procedures And Recertification Procedures For EPA's Standard Reference Ozone Photometer, EPA Contract 68-D3-0029, September 1997, TRC Environmental Corporation and National Institute of Standards and Technology (NIST)
8. Hampson, R.F. (ed.). "Survey of Photochemical Rate Data for Twenty-Eight Reactions of Interest in Atmospheric Chemistry." *J. Phys. Chem Ref. Data*, 2:267, 1973

APPENDIX A

Example #1: Completed OCDS

(Total 4 sheets – Region 4 OCDS example)

Example #2: Excel™ Worksheet Template

(Total 4 sheets – Calibration Template)

Example #3: Example Verification Summary Report

(Single page – Compiled Calibration Template Results into Summary Report)

Example #4: Calibration Report to Client

(Total 4 sheets – Cover Page, Summary, Calibration 2 pages)

Example #5: Annual SRP to SRP Verification

(Total 4 sheets – SRP-10 and SRP-1 Reports)